

What is claimed is:

1. A treating agent for forming a protective coating, comprising an alkali silicate, as represented by the formula  $M_2O \cdot nSiO_2$  [where n represents a number of 2 to 9, and M represents at least one of Na, K, Li, and  $NR_4$  (where R independently represents a hydrogen atom or an alkyl group)], at least one lubricating component selected from among oils, soaps, metallic soaps, waxes, and polytetrafluoroethylenes, and water.

2. A treating agent for forming a protective coating according to Claim 1, wherein the amount of alkali silicate is 10 to 99 mass% and the amount of lubricating component is 1 to 90 mass% on the basis of the total mass of alkali silicate and lubricating component.

3. A treating agent for forming a protective coating according to Claim 1, additionally comprising a viscosity modifier.

4. A treating agent for forming a protective coating according to Claim 1, wherein the alkali silicate is at least one selected from the group consisting of sodium silicates and potassium silicates with  $SiO_2/M_2O$  molar ratios of 2 to 4, lithium silicates with  $SiO_2/M_2O$  molar ratios of 3.5 to 8.5, and ammonium silicates with  $SiO_2/M_2O$  molar ratios of 3 to 9.

5. A treating agent for forming a protective coating according to Claim 1, comprising at least one oil selected from the group consisting of plant and animal oils, mineral oils, and synthetic oils.

6. A treating agent for forming a protective coating according to Claim 1, comprising at least one soap selected from the group consisting of sodium stearate and potassium stearate.

7. A treating agent for forming a protective coating according to Claim 1, comprising at least one metallic soap selected from the group consisting of calcium stearate, aluminum stearate,

barium stearate, lithium stearate, and zinc stearate.

8. A treating agent for forming a protective coating according to Claim 1, comprising at least one wax selected from the group consisting of polyethylene wax, polypropylene wax, carnauba wax, beeswax, and paraffin wax.

5           9. A treating agent for forming a protective coating according to Claim 1, additionally comprising at least one viscosity modifier selected from the group consisting of organic polymer-based thickeners and inorganic thickeners.

10           10. A treating agent for forming a protective coating according to Claim 1, additionally comprising at least one organic polymer-based thickener selected from the group consisting of hydroxyethylcellulose, carboxymethylcellulose, polyacrylamide, sodium polyacrylate, polyvinylpyrrolidone, and polyvinyl alcohol.

11. A treating agent for forming a protective coating according to Claim 1, additionally comprising at least one inorganic thickener selected from the group consisting of finely powdered silica, bentonite, kaolin, and synthetic hectorite.

15           12. A treating agent for forming a protective coating according to Claim 1, additionally comprising at least one substance selected from the group consisting of solid lubricants and extreme-pressure additives.

20           13. A metallic material having a protective coating, wherein said protective coating is formed by drying a treating agent for forming a protective coating according to Claim 1 on a surface of the metallic material.

14. A metallic material having a protective coating according to Claim 13, wherein the coating weight of the protective coating after being dried is 0.3 to 50 g/m<sup>2</sup>.

15. A metallic material according to Claim 13, wherein the metallic material is at least

one selected from the group consisting of iron, steel, copper, copper alloys, aluminum, aluminum alloys, titanium, and titanium alloys.

16. A method for forming a protective coating on a surface of a metallic material, comprising applying a treating agent for forming a protective coating according to Claim 1 on  
5 said surface.

17. A method for forming a protective coating according to Claim 16, comprising the additional steps of drying the treating agent for forming a protective coating on said surface and applying at least one lubricating component selected from the group consisting of oils, soaps, metallic soaps, waxes, and polytetrafluoroethylenes on said surface.

10 18. A treating agent for forming a protective coating, comprising at least alkali silicate selected from the group consisting of sodium silicates and potassium silicates with  $\text{SiO}_2/\text{M}_2\text{O}$  molar ratios of 2 to 4, lithium silicates with  $\text{SiO}_2/\text{M}_2\text{O}$  molar ratios of 3.5 to 8.5, and ammonium silicates with  $\text{SiO}_2/\text{M}_2\text{O}$  molar ratios of 3 to 9, at least one lubricating component in dispersed, emulsified, or both dispersed and emulsified form selected from among oils, soaps, metallic  
15 soaps, waxes, and polytetrafluoroethylenes, and water and wherein the amount of alkali silicate is 15 to 95 mass% and the amount of lubricating component is 5 to 85 mass% on the basis of the total mass of alkali silicate and lubricating component.

19. A treating agent for forming a protective coating according to Claim 18, additionally comprising a viscosity modifier.

20 20. A treating agent for forming a protective coating according to Claim 18, wherein the alkali silicate is at least one selected from the group consisting of sodium silicates and potassium silicates with  $\text{SiO}_2/\text{M}_2\text{O}$  molar ratios of 2 to 4.

21. A treating agent for forming a protective coating according to Claim 18, comprising

at least one oil selected from the group consisting of plant and animal oils, mineral oils, and synthetic oils.

22. A treating agent for forming a protective coating according to Claim 18, comprising at least one soap selected from the group consisting of sodium stearate and potassium stearate.

5        23. A treating agent for forming a protective coating according to Claim 18, comprising at least one metallic soap selected from the group consisting of calcium stearate, aluminum stearate, barium stearate, lithium stearate, and zinc stearate.

24. A treating agent for forming a protective coating according to Claim 18, comprising at least one wax selected from the group consisting of polyethylene wax, polypropylene wax,  
10        carnauba wax, beeswax, and paraffin wax.

25. A treating agent for forming a protective coating according to Claim 18, additionally comprising at least one viscosity modifier selected from the group consisting of organic polymer-based thickeners and inorganic thickeners.

26. A treating agent for forming a protective coating according to Claim 18, additionally  
15        comprising at least one organic polymer-based thickener selected from the group consisting of hydroxyethylcellulose, carboxymethylcellulose, polyacrylamide, sodium polyacrylate, polyvinylpyrrolidone, and polyvinyl alcohol.

27. A treating agent for forming a protective coating according to Claim 18, additionally comprising at least one inorganic thickener selected from the group consisting of finely powdered  
20        silica, bentonite, kaolin, and synthetic hectorite.

28. A treating agent for forming a protective coating according to Claim 18, additionally comprising at least one substance selected from the group consisting of solid lubricants and extreme-pressure additives.

29. A metallic material having a protective coating, wherein said protective coating is formed by drying a treating agent for forming a protective coating according to Claim 18 on a surface of the metallic material.

30. A metallic material having a protective coating according to Claim 29, wherein the  
5 coating weight of the protective coating after being dried is 1 to 30 g/m<sup>2</sup>.

31. A metallic material according to Claim 29, wherein the metallic material is at least one selected from the group consisting of iron, steel, copper, copper alloys, aluminum, aluminum alloys, titanium, and titanium alloys.

32. A method for forming a protective coating on a surface of a metallic material,  
10 comprising applying a treating agent for forming a protective coating according to Claim 18 on said surface.

33. A method for forming a protective coating according to Claim 32, comprising the additional step of drying the treating agent for forming a protective coating on said surface at a temperature of 60 to 150°C.

15